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**IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF CALIFORNIA  
OAKLAND DIVISION**

IN RE DYNAMIC RANDOM ACCESS  
MEMORY (DRAM) DIRECT PURCHASER  
ANTITRUST LITIGATION

Case No. 4:18-cv-03805

**CONSOLIDATED COMPLAINT  
CLASS ACTION**

THIS DOCUMENT RELATES TO:

**DEMAND FOR JURY TRIAL**

ALL DIRECT PURCHASER ACTIONS

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## I. INTRODUCTION

1. This action is brought as a class action on behalf of a plaintiff class consisting of all persons and entities in the United States who purchased Dynamic Random Access Memory (“DRAM”) directly from the named defendants during the period from approximately June 1, 2016 through at least February 2018 (“Class Period”).

2. DRAM is high density, low-cost-per-bit, random access memory components that store digital information and provide high-speed storage and retrieval of data. DRAM is used in products, such as personal computers, servers, laptops, tablets, televisions, printers, cameras, and cellphones, and in industrial applications, such as automotive, military, and aviation devices. DRAM is used as a storage module to hold data as it is processed. DRAM is sold in individual chips or as modules with several chips attached to the module.

3. Defendants are the leading manufacturers of DRAM, with a combined worldwide market share of approximately 95%.

4. As alleged in detail in this Complaint, this is a classic case of manufacturers in control of a commodity product—with little to no price elasticity—agreeing to limit their production and slow their capacity to increase prices. Immediately prior to and during the Class Period, Defendants agreed to delay or slow capacity, or not to expand capacity at all. Defendants’ conduct was a marked departure from their conduct prior to the Class Period and, as Defendants intended, it stopped DRAM prices from falling and caused prices to increase dramatically.

5. The economic evidence likewise suggests that Defendants acted against their own self-interest. Defendants collectively control approximately 95% of the DRAM market. When presented with an opportunity to capture market share from competitors, however, Defendants failed (or refused) to do so. For example, the Samsung Defendants restricted DRAM production in 2016 despite acknowledging they “expect[ed] demand to increase” in a second quarter earnings report. Had the Samsung Defendants continued DRAM production at levels consistent with previous periods, they would have earned higher total profits. Instead, the Samsung Defendants decreased DRAM production, thus acting against their own self-interest. Similarly, the SK Hynix and Micron Defendants decreased DRAM production despite rising demand in the market.

1 Economic data shows that overall DRAM production levels stagnated even while DRAM prices  
2 soared, indicating that DRAM producers were not meeting market demand despite the ability to do  
3 so. Had any Defendant increased production in response to rising demand, it could have achieved  
4 additional market share or greater profits.

5 6. Plaintiffs allege that during the Class Period, Defendants conspired, combined, and  
6 contracted to fix, raise, maintain, and stabilize the prices at which DRAM was sold in the United  
7 States. As a result of Defendants' conduct, Plaintiffs and the other members of the Class paid  
8 artificially inflated prices for DRAM during the Class Period. Such prices exceeded the amount  
9 they would have paid if the price for DRAM had been determined by a competitive market.

## 10 **II. JURISDICTION AND VENUE**

11 7. Plaintiffs bring this action under §§ 4, 12, and 16 of the Clayton Act (15 U.S.C. §§  
12 15, 22, and 26) for treble damages, injunctive relief, and reasonable attorneys' fees and costs with  
13 respect to the injuries sustained by Plaintiffs arising from violations by Defendants of the federal  
14 antitrust laws, including Section 1 of the Sherman Antitrust Act (15 U.S.C. § 1).

15 8. This Court has jurisdiction over this action pursuant to 28 U.S.C. §§ 1331, 1337(a)  
16 and 1367.

17 9. This Court has *in personam* jurisdiction over each of the Defendants because each  
18 Defendant, either directly or through the ownership or control of its United States subsidiaries,  
19 *inter alia*: (a) transacted business in the United States, including in this District; (b) directly or  
20 indirectly sold or marketed substantial quantities of DRAM throughout the United States,  
21 including in this District; (c) had substantial aggregate contacts with the United States as a whole,  
22 including in this District; or (d) were engaged in an illegal price-fixing conspiracy that was  
23 directed at, and had a direct, substantial, reasonably foreseeable and intended effect of causing  
24 injury to, the business or property of persons and entities residing in, located in, or doing business  
25 throughout the United States, including in this District. Defendants also conduct business  
26 throughout the United States, including in this District, and they have purposefully availed  
27 themselves of the laws of the United States.

10. Venue is proper in this District pursuant to 15 U.S.C. §§ 15 and 22, and 28 U.S.C. § 1391(b) and (c), in that at least one of the Defendants resides in this judicial district, is licensed to do business, or is doing business in this judicial district.

### **III. THE PARTIES**

#### **A. Plaintiffs**

11. Plaintiff John Treanor is a resident of Los Angeles, California. During the Class Period, Plaintiff purchased DRAM directly from one of the Defendants and/or their subsidiaries and suffered injury as a result of Defendants' unlawful conduct. As a result of the conspiracy alleged herein, Plaintiff has been injured in his business or property in that the price he paid for DRAM was artificially raised, maintained, or stabilized at a supra-competitive level by Defendants and their co-conspirators.

12. Plaintiff onShore Networks of Illinois, L.L.C. (d/b/a onShore Networks, L.L.C.) is an Illinois corporation with its principal place of business in Chicago, Illinois. During the Class Period, Plaintiff purchased DRAM directly from one of the Defendants and/or their subsidiaries and suffered injury as a result of Defendants' unlawful conduct. As a result of the conspiracy alleged herein, Plaintiff has been injured in its business or property in that the price it paid for DRAM was artificially raised, maintained, or stabilized at a supra-competitive level by Defendants and co-conspirators.

#### **B. Defendants**

##### **1. The Micron Defendants**

13. Defendant Micron Technology, Inc. ("Micron Technology") is a Delaware corporation with its principal place of business at 8000 South Federal Way, Boise, Idaho 83716. Micron Technology is a foreign stock corporation registered with the California Secretary of State and authorized to transact intrastate business in California. During the Class Period, Micron Technology manufactured, sold, and distributed DRAM throughout the United States.

14. Defendant Micron Semiconductor Products, Inc. ("Micron Semiconductor") is an Idaho corporation located at 8000 South Federal Way, Boise, Idaho 83716. Micron Semiconductor is a foreign stock corporation registered with the California Secretary of State and authorized to

1 transact intrastate business in California. Micron Semiconductor is a wholly owned and controlled  
2 subsidiary of Micron Technology. During the Class Period, Micron Semiconductor sold and  
3 distributed DRAM to customers throughout the United States.

4 15. Defendant Micron Consumer Products Group, Inc. (“Micron Consumer”) is a  
5 Delaware corporation located at 8000 South Federal Way, Boise, Idaho 83716. Micron Consumer  
6 is a foreign stock corporation registered with the California Secretary of State and authorized to  
7 transact intrastate business in California. Micron Consumer is a wholly owned and controlled  
8 subsidiary of Micron Technology. During the Class Period, Micron Consumer sold and distributed  
9 DRAM to customers throughout the United States. Micron Consumer is the “consumer-facing  
10 entity of Micron Technology.” The Micron Consumer name brought several entities—Lexar  
11 Media, Inc. (U.S.), Crucial Technology (U.S.), Lexar Media (EMEA region), Lexar Media  
12 (APAC region), and Lexar Media (Japan) under one name as of July 17, 2012. Micron Consumer  
13 sells, among other things, Crucial-branded DRAM in the U.S. via [www.crucial.com](http://www.crucial.com). Crucial is a  
14 Micron Technology brand.

15 16. Defendants Micron Technology, Micron Semiconductor, and Micron Consumer are  
16 collectively referred to herein as “Micron.”

## 17 2. The Samsung Defendants

18 17. Defendant Samsung Electronics Co., Ltd. (“SEC”) is a Korean corporation and  
19 maintains its executive offices at 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea.  
20 During the Class Period, SEC manufactured, sold, and distributed DRAM throughout the world,  
21 including the United States.

22 18. Defendant Samsung Semiconductor, Inc. (“SSI”) is a California corporation located  
23 at 3655 North First Street, San Jose, California 95134. SSI is a wholly owned “multi-billion dollar  
24 subsidiary” of SEC. During the Class Period, SSI sold and distributed DRAM throughout the  
25 United States.

26 19. Defendants SEC and SSI are collectively referred to herein as “Samsung.”

27 ///

### 3. The SK Hynix Defendants

20. Defendant SK Hynix, Inc. (f/k/a Hynix Semiconductor, Inc.) (“SK Hynix Korea”) maintains its head offices at 2091, Gyeongchung-daero, Bubal-eub, Icheon-si, Gyeonggi-do, Korea. SK Hynix Korea “is the second-largest memory chip manufacturer in the world, leading the global memory semiconductor market and the sixth-largest company in the semiconductor field.” SK Hynix Korea’s “main products are DRAM and NAND flash.” During the Class Period, SK Hynix Korea manufactured, sold, and distributed DRAM throughout the world, including the United States.

21. Defendant SK Hynix America, Inc. (f/k/a Hynix Semiconductor America, Inc.) (“SK Hynix America”) is a California corporation located at 3101 North First Street, San Jose, California 95134. SK Hynix America is a wholly owned and controlled subsidiary of SK Hynix Korea. During the Class Period, SK Hynix America sold and distributed DRAM throughout the United States.

22. Defendant SK Hynix Korea and SK Hynix America are collectively referred to herein as “SK Hynix.”

23. Micron, Samsung, and SK Hynix are collectively referred to herein as “Defendants.”

### IV. AGENTS AND CO-CONSPIRATORS

24. Various other individuals, partnerships, corporations, and other business entities, unknown to the Plaintiffs, have participated in the violations alleged herein and have performed acts and made statements in furtherance thereof. Plaintiffs reserve the right to name some or all these persons as defendants later.

25. The acts charged in this complaint have been done by Defendants or were ordered or done by Defendants’ officers, agents, employees, or representatives, while actively engaged in the management of Defendants’ affairs.

26. Whenever in this complaint reference is made to any act, deed, or transaction of any corporation, the allegation means that the corporation engaged in the act, deed or transaction by or through its officers, directors, agents, employees or representatives while they were actively



engaged in the management, direction, control or transaction of the corporation's business or affairs.

27. Each Defendant or co-conspirator acted as the principal, agent, or joint venture of, or for, other Defendants and co-conspirators with respect to the acts, violations, and common course of conduct alleged by Plaintiffs. Each Defendant and co-conspirator that is a subsidiary of a foreign parent acts as the United States agent for DRAM made by its parent company.

## **V. CLASS ACTION ALLEGATIONS**

27. Plaintiffs bring this action both on behalf of himself and as a class action pursuant to Federal Rules of Civil Procedure 23(a) and (b)(3), on behalf of the following class:

All individuals and entities who, during the period from approximately June 1, 2016 through at least February 2018, purchased DRAM in the United States directly from one or more of the Defendants, their subsidiaries, or their affiliates. Excluded from the Class are Defendants and their parents, subsidiaries, affiliates, all governmental entities, and co-conspirators.

28. Plaintiffs do not know the exact number of class members because such information is in the exclusive control of Defendants. Plaintiffs believe that, due to the nature of the trade and commerce involved, there are likely thousands of class members, geographically dispersed throughout the United States such that joinder of all class members is impracticable.

29. Plaintiffs' claims are typical of the claims of the class in that Plaintiffs are direct purchaser of DRAM, all class members were damaged by the same wrongful conduct of Defendants and their coconspirators as alleged herein, and the relief sought is common to the class.

30. Numerous questions of law or fact arise from Defendants' anticompetitive conduct that are common to the class. Among the questions of law or fact common to the class are:

- a. Whether Defendants engaged in a contract, combination or conspiracy among themselves to fix, maintain, or stabilize the prices for DRAM sold in the United States;
- b. Whether Defendants engaged in a contract, combination, or conspiracy to restrict output of DRAM sold in the United States;
- c. Whether Defendants restricted output of DRAM sold in the United States and committed other conduct in furtherance of the alleged conspiracy;

1           d.     Whether the conduct of Defendants caused prices of DRAM sold in the  
2                 United States to be artificially inflated to non-competitive levels; and

3           e.     Whether Plaintiffs and other members of the class were injured by the  
4                 conduct of Defendants and, if so, the appropriate class-wide measure of  
5                 damages and appropriate injunctive relief.

6           31.    These questions of law or fact are common to the class and predominate over any  
7                 other questions affecting only individual class members.

8           32.    Plaintiffs will fairly and adequately represent the interests of the class in that  
9                 Plaintiffs are direct purchasers of DRAM from at least one Defendant and have no conflicts with  
10                any other member of the class. Furthermore, Plaintiffs have retained competent counsel  
11                experienced in antitrust and class action litigation.

12          33.    A class action is superior to the alternatives, if any, for the fair and efficient  
13                 adjudication of this controversy.

14          34.    Prosecution of separate actions by individual class members would create the risk  
15                 of inconsistent or varying adjudications, establishing incompatible standards of conduct for the  
16                 Defendants.

17          35.    Injunctive relief is appropriate as to the class because Defendants have acted or  
18                 refused to act on grounds generally applicable to the class.

19          36.    Plaintiffs reserve the right to expand, modify, or alter the class definition in  
20                 response to information learned during discovery.

21   **VI.   TRADE AND COMMERCE**

22          37.    During the Class Period, Defendants, or one or more of their subsidiaries, sold and  
23                 shipped substantial quantities of DRAM in the United States in a continuous and uninterrupted  
24                 flow of interstate and international commerce to customers, including through and into this judicial  
25                 district.

26          38.    The business activities of Defendants that are the subject of this complaint were  
27                 within the flow of, and substantially affected, interstate trade and commerce in the United States  
28                 and caused antitrust injury in the United States.

1           39. During the Class Period, Defendants collectively controlled most of the market—  
2 approximately 95%—for DRAM, both globally and in the United States.

3 **VII. STATEMENT OF FACTS**

4 **A. What is DRAM?**

5           40. DRAM is one of the most common forms of semiconductor memory, a vital  
6 component in modern digital electronics. Composed of silicon wafers, DRAM are high density,  
7 low-cost-per-bit, random access memory components that store digital information and provide  
8 high-speed storage and retrieval of data used in personal computers and servers, laptops, tablets,  
9 televisions, printers, cameras, cellphones, and in industrial applications, such as automotive,  
10 military, and aviation devices. DRAM is used as a storage module to hold data as it is processed.  
11 DRAM is sold in individual chips or as modules with several chips attached to the module.

12           41. DRAM stores each “bit” of data in a separate capacitor within an integrated circuit.  
13 The “bit” is the basic unit of information stored in DRAM. A key attribute of a DRAM chip is its  
14 density—the amount of information it can store in the tiny circuits etched into its silicon surface.  
15 This attribute makes it very attractive for use in digital electronics and in industrial applications.

16           42. “RAM” or “Random Access Memory” is the information storage or memory in a  
17 computer that stores running programs and data for the programs. Data (information) in the RAM  
18 can be read and written quickly in any order. Normally, the RAM is in the form of computer chips,  
19 such as DRAM.

20           43. Each capacitor on a DRAM chip can be either charged or discharged; these two  
21 states are taken to represent the two values of a bit, conventionally called 0 and 1. Since even  
22 “non-conducting” transistors always leak a small amount, the DRAM capacitors will slowly  
23 discharge, and the information eventually fades unless the capacitor charge is refreshed  
24 periodically. Because of this refresh requirement, it is a dynamic random-access memory as  
25 opposed to static random-access memory (SRAM) and other static types of memory. Unlike flash  
26 memory, DRAM is volatile memory (versus non-volatile memory) since it loses its data quickly  
27 when power is removed. However, DRAM does exhibit limited data remanence.

**B. DRAM Industry: Background**

44. The DRAM industry is a multi-billion-dollar industry. The DRAM market grew to \$73 billion in revenue in 2017, a growth rate of 77%. In the first quarter of 2018, Samsung achieved revenue of a record-high \$10.36 billion from global DRAM sales. Defendants are the world's largest manufacturers of DRAM.

45. The DRAM market is highly concentrated, with just three companies dominating the industry. Defendants Samsung, Micron, and SK Hynix grew their combined market share from "just under 60% in 2007 to 95% in Q2 [of] 2017."

46. Defendants control the DRAM supply globally and their customers require a certain amount of DRAM for their products to work, thus DRAM is a "sellers' market." "Device manufacturers need a certain amount of DRAM to meet performance requirements for systems that they may have worked on developing several quarters ago. This forces companies to buy DRAM irrespective of higher prices, without being able to meaningfully scale back."

47. DRAM is a commodity. Price quotes depend on supply and demand for the most part rather than on technological advantages. Like other electronic product markets that have been the subject of antitrust investigations (Cathode Ray Tubes, Lithium Ion Batteries, and Capacitors), the DRAM market has characteristics that make it susceptible to collusion, including: (a) a concentrated market dominated primarily by a few companies (here, the three Defendants control approximately 95% of the market); (b) significant barriers to entry; (c) inelastic downstream demand (for products made with the products at issue); (d) standardization or commoditization of products; (e) avenues that allow the Defendants to exchange or signal competitive information; and (f) pricing behavior that is inconsistent with a competitive market.

48. For example, Defendants had many chances to collude through common participation in trade associations and industry groups, and through their overlapping business relationships. Defendants also had the means to monitor each other's compliance with agreements not to compete, through DRAMeXchange—a research unit of TrendForce, a market intelligence provider, and an authoritative source for DRAM-related data oft-cited and widely-relied upon by industry analysts and participants. DRAMeXchange provides subscribers with up to date (monthly,

1 in some cases daily) information about defendants' capital expenditure capacity by specific brand  
 2 and plant, output by specific brand, plant, and type of DRAM, production process and technology  
 3 utilized, supply-demand sufficiency, and spot and contract prices. This is precisely the type of  
 4 information conspirators require to collude. Defendants all subscribed to DRAMeXchange.

5 49. The DRAM market also has substantial barriers to entry. As noted by Micron CFO  
 6 Ernie Maddock, "[T]here are extremely significant intellectual property hurdles and knowledge  
 7 hurdles" to participate in the market. To overcome these obstacles, Maddock notes that companies  
 8 like "Samsung, Hynix, and Micron . . . each . . . has hundreds and thousands of people years  
 9 invested in the knowledge and IP necessary to do what [they] do." Maddock further admits that he  
 10 does not "think that that knowledge can be replicated very easily at all and as a result there will be  
 11 some challenge for China to organically enter the DRAM market."

12 50. Maddock's perception of the DRAM market is shared by others in the industry as  
 13 well. Samsung stated on its first quarter earnings call on April 26, 2017 that:

14 It is true that the Chinese companies recently have been trying to break into the  
 15 memory market. But the memory market itself has evolved during the past and . .  
 16 . it is now protected by quite a high barrier to entry because (sic) memory  
 business today requires not only a very cutting-edge processes migrated, but also  
 needs to have various high value-add solutions to go with the products.

17 51. The DRAM market is also characterized as inelastic by those in it. In describing the  
 18 DRAM market, Maddock said:

19 [W]e haven't seen major capacity additions really since 2014. And certainly if  
 20 you look at the public commentary of all the industry participants as well as  
 21 actually the equipment suppliers who supply all of us I think there is a general  
 22 belief that the industry participants are keenly aware of the fact that the DRAM  
 market is relatively inelastic and the way you serve that market is by making sure  
 there is adequate, but not excess supply.

### 23 **C. Defendants' Pre-Class Period Conduct**

24 52. In the years prior to the Class Period, Defendants made independent, competitive  
 25 decisions regarding supply and capacity, which led to declining DRAM prices.

26 53. For example, on Samsung's second quarter earnings call on July 31, 2014, Samsung  
 27 noted its expectation for its bit growth to be higher than the industry:

28 For DRAM our bit growth in second quarter was approximately 20% q-on-q and  
 we expect for the third quarter the market DRAM bit growth will come in at high

1 single digit and we will outgrow the market's bit growth. At this point we expect  
2 the DRAM market bit growth for 2014 to be low 30% and we expect our bit  
3 growth for the year to be high 40%. The second quarter we experienced ASP  
4 decline of DRAM at low single digit.

5 Samsung noted that "while the market demand remains strong, the suppliers weren't able to  
6 bring on additional supply much more other than us, and therefore we were in a very good position  
7 to capture this opportunity. That is resulting in the higher bit growth expectations that you have  
8 heard."

9 54. On Samsung's third quarter earnings call on October 30, 2014, Samsung stated its  
10 policy "that our bit growth rate next year should or would have to be higher than the industry. That  
11 is our goal." Samsung also noted in response to investor questions that "if we see the price to be  
12 very attractive, then we can use the idle capacity to increase our work in progress, which has  
13 helped us this year."

14 55. Again, on Samsung's fourth quarter earnings call on January 29, 2015, Samsung  
15 discussed its plans to exceed market growth:

16 For DRAM business in Q4, our bit growth was flat from Q3 as well as ASP which  
17 was also flat. For the first quarter 2015 for DRAM bit growth, we expect both  
18 market and Samsung Electronics to be flat from Q4. We are expecting about mid  
19 20% bit growth for market growth for DRAM and our bit growth we believe will  
20 outgrow that of the market growth.

21 56. In response to investor questions, Samsung noted that:

22 [A] shortage in the industry would be great news. I don't think a shortage will  
23 happen overnight. We will have signs to indicate a shortage coming forward, and  
24 so if we do see such signs such as the economy picking up or orders for other  
25 components picking up, I am sure – looking at all of the resources that we have,  
26 not only in our side but also in the overall semiconductor side, personally I think  
27 that we will find a way of capturing any shortage opportunities if they do  
28 materialize.

29 Samsung reiterated its plans to outgrow the industry: "the main reason why we are  
30 planning and expecting to outgrow the industry is because we have better productivity compared to  
31 our competitors based on our technology leadership in terms of the manufacturing. That is the  
32 main reason why we're expecting to outgrow the industry." Samsung further noted that "the reason  
33 why last year and the year before the situation on the DRAM side was so favorable for us was  
34 mainly caused from the supply side rather than the demand side."

1           57.     DRAMeXchange reported that DRAM prices declined from October 2014 to June  
2 2016, with “the average contract price of DDR3 4GB plunging 62% from US\$32.75 to US\$12.5.”

3           **D.     From 2015, Micron Made Public Comments, Calling for Supply Restrictions**

4           58.     From 2015, Micron made public comments, inviting its competitors to stop adding  
5 significant capacity, and Samsung and SK Hynix responded.

6           59.     For example, on Micron Technology’s first quarter earnings call on January 6,  
7 2015, Mark Durcan, Micron’s then-CEO, stated that Micron expected “continued favorable market  
8 conditions for 2015 led by constrained supply in DRAM.” Durcan further indicated that Micron  
9 expected “industry bit growth in the low to mid 20% range in 2015 with the development of  
10 advanced process technology proving to be disruptive to wafer production.” Durcan concluded by  
11 sharing Micron’s belief that “even with steps taken to address the otherwise declining gross wafer  
12 production in DRAM the net wafer output in the industry will stay relatively steady or decline  
13 slightly going forward leading to a relative stability of bit supply growth even beyond 2015.”

14           60.     On Micron’s second quarter earnings call on April 1, 2015, Durcan made similar  
15 comments, stating, “[f]or 2016 . . . we expect to be in line with or slightly above the industry bit  
16 growth.” Durcan went on to say that the DRAM industry is “a more rational industry and with that  
17 is coming better behavior” and that Micron would “do the right things to run our business,”  
18 including, “not selling inventory below acceptable prices.”

19           61.     During this same second quarter earnings call, Mark Adams, Micron’s then-  
20 President and interim CFO, also signaled movements in Micron’s capacity, stating, “[a]lthough  
21 these manufacturing moves generally weigh on production bit output guidance, our DRAM  
22 process transitions will more than make up for the bit or wafer effect. As a result, we are guiding to  
23 high single digit sequential output growth for each of the next couple of quarters.”

24           62.     On Micron’s third quarter earnings call on June 25, 2015, Durcan described overall  
25 DRAM market conditions, saying Micron expected “stabilizing ASPs across the broader market  
26 over time.” He further explained that “[c]onsistent with prior expectations, we are forecasting  
27 DRAM industry supply bit growth in the mid-20s in calendar 2015 and in the low to mid 20% in  
28 calendar 2016.”



1           63.     On Samsung's second quarter earnings call on July 30, 2015, Samsung indicated its  
2 willingness to abide by Micron's public invitation to limit capacity, stating:

3           For us it's always been an issue of profitability. Profitability is the top priority of  
4 the business that we operate, rather than competing over market share. I feel that  
5 it's inappropriate for us to directly mention or comment about production or  
6 growth of a specific company, but what we can say is that if you look at this year,  
even the bit growth overall, including ourselves, was less than what was expected  
up until now.

7           64.     On Micron's fourth quarter earnings call on October 1, 2015, Durcan reiterated  
8 Micron's expectation that "industry supply and demand for both DRAM and NAND to be  
9 relatively balanced in 2016."

10          65.     At the UBS Global Technology Conference on November 17, 2015, Micron CFO  
11 Ernie Maddock recognized that Micron was in "an environment where you have closely held  
12 technology by a very limited number of producers." Maddock noted that "you're seeing some  
13 really rational decisions" and that "we don't foresee a reason that there would be any significant  
14 DRAM capacity expansion."

15          66.     On Micron's first quarter 2016 earnings call on December 22, 2015, Mark Durcan,  
16 similarly noted that "[t]he DRAM industry consist[s] of only three technology developers, based  
17 on current long-term outlook we foresee technology driven supply growth slowing and can  
18 envision a future in which no additional DRAM wafer capacity is required." Micron estimated that  
19 "industry bit supply growth will be in a low 20% range in 2016, in line with demand and that  
20 industry fundamentals will remain healthy over the long-term."

21          67.     In early 2016, DRAM prices were still falling with Micron reporting a "30%  
22 decline in revenue was paired with a quarterly loss." Reports noted "Micron's financial  
23 performance going forward is going to depend heavily on DRAM pricing, and it will take a  
24 stabilization of prices before Micron is able to return to earnings growth. Unfortunately for the  
25 company, there's not much reason to believe that DRAM prices will improve anytime soon."  
26 Analysts noted Samsung's past "aggressive behavior," with its focus on expanding its market share  
27 in DRAM. One commentator even noted that Samsung may be "the sole survivor in DRAM" as a  
28 result of its competitive behavior.



68. On Micron's second quarter earnings call on March 30, 2016, when questioned about the likelihood of the company cutting production to ease supply, Micron's then-CEO Mark Durcan stated "we think we would be foolish to be the first ones to take capacity off," while Micron CFO Ernie Maddock stated "it's a really ill-advised move to be unilaterally cutting production." Mr. Durcan also signaled that Micron would not try to take market share from its competitors: "Our focus isn't on market share. Our focus is on making sure that we've deployed equivalent advanced technology, at least equivalent advanced technology to our competitor, so that we're not incentivizing others to play for market share."

69. SK Hynix reported a 17% fall in revenue from the previous quarter in March 2016. While analysts suggested that Samsung appeared to be engaging in a competitive price war, SK Hynix announced its plans for "a below-industry growth rate while protecting its unit sales prices."

**E. In 2016, Defendants Changed Their Behavior, Responding to Micron's Invitations to Restrict Supply**

70. Within a month of Micron's statements, Samsung announced at its first quarter earnings call on April 28, 2016 that "[f]or DRAM business in Q1 this year, our bit growth was negative low single digit with low teens of ASP decline." In response to investor questions, Samsung noted: "We don't expect there to be major increases in supply of DRAM in the near future. . . . And we will in terms of full year 2016 DRAM shipment we expect to be in line with the market growth."

71. SK Hynix seemingly responded to Micron's invitation as well. Despite fear from industry analysts that SK Hynix would be hurt by a competitive price war with Samsung, *Barron's* reported that "Hynix does not seem to be striking back."<sup>1</sup>

72. At the JP Morgan Global Technology, Media and Telecom Conference on May 25, 2016, Durcan noted that "bit growth next year will be 20%-ish" "as long as nobody adds any incremental DRAM wafers," and "[i]f wafers actually come down as we're starting to hear some equipment suppliers talk about, then it could be mid- to high-teens, in which case that would be

<sup>1</sup> Shuli Ren, *SK Hynix Sees Quick Rebound In Q2, No Price War In DRAM, NAND*, *Barron's* (October 25, 2019, 4:18 PM), <https://www.barrons.com/articles/sk-hynix-sees-quick-rebound-in-q2-no-price-war-in-dram-nand-1461638470>.

1 more beneficial.” Durcan noted that, in 2014, Samsung “added some wafers probably more than  
 2 they in retrospect would have . . . I don’t think the intention was to oversupply the market. But  
 3 following that, we had a fairly significant decline over the last couple of years[.]” When asked if  
 4 Micron and its competitors were being disciplined regarding the DRAM segment of the market,  
 5 Durcan continued, “[W]e all are going to either benefit or be hurt by excess supply in the  
 6 marketplace.” Durcan stated that he expected Defendants to maintain discipline regarding bit  
 7 growth: “there’s a natural tightening tendency absent, somebody wanting to do something different  
 8 than that. And so I’m – I actually remain bullish on the long term value, the DRAM business and  
 9 the actions of the competitors in the marketplace.”

10 73. On May 26, 2016, the World Semiconductor Council’s 20th Anniversary Meeting  
 11 took place in Seoul, South Korea. Park Sung-wook, CEO of SK Hynix, was one of six chairmen of  
 12 the World Semiconductor Council. The meeting was attended by representatives from China,  
 13 Taiwan, the EU, Japan, the U.S., and Korea. Samsung Electronics was one of those in attendance,  
 14 with one Samsung attendee quoted in media reports following the meeting. Just days before the  
 15 start of the Class Period, representatives of at least two Defendants had a clear opportunity to  
 16 communicate directly. Defendants are also all members of the United States’ Semiconductor  
 17 Industry Association, which appoints delegates as members of the World Semiconductor Council.

18 **F. During the Class Period, Defendants’ Agreement to Restrict DRAM Supply**  
 19 **Led to Rising DRAM Prices**

20 74. As alleged in detail below, immediately prior to and during the Class Period,  
 21 Defendants agreed to delay or slow capacity, or not to expand capacity at all. This coordination  
 22 aided Defendants’ efforts to stop DRAM prices from falling and caused prices to dramatically  
 23 reverse course. One method Defendants used to effectuate their agreement was to communicate  
 24 their shared intentions to limit DRAM capacity through public statements, and each taking the  
 25 agreed upon actions in response.

26 75. Defendants made statements in earnings calls, press releases, media, or other public  
 27 documents and monitored each other’s plans.

1           76. Defendants’ statements about capacity discipline, limiting production or supply, not  
2 increasing supply/capacity, slowing growth in capacity or supply, etc. represented a deviation from  
3 past business practices.

4           77. By reassuring each other through these communications, Defendants demonstrated  
5 each was committed to maintaining capacity and supply discipline during steady increases in  
6 demand and rising prices – unlike in 2014, and contrary to their individual interest in increasing  
7 market share and short-term profits.

8           78. In fact, Defendants’ conspiratorial conduct was extremely effective in causing  
9 DRAM prices to climb sharply from the middle of 2016 to the present. During this period, DRAM  
10 spot prices rose approximately 350%—an increase totally unique compared to DRAM’s prior  
11 pricing history. Defendants, as a result, reaped huge profits during the Class Period.

12           79. Defendants’ illegal behavior, alleged herein, artificially stabilized and raised the  
13 prices of DRAM during the Class Period. As a result, DRAM prices were higher than they would  
14 have been absent the conspiracy.

15           80. After several public statements by Micron regarding the need to limit capacity, in  
16 2016, Samsung responded to Micron’s invitations and abruptly changed its behavior. Rather than  
17 aggressively pursuing market share, Samsung changed focus. On January 29, 2016, Samsung, at its  
18 fourth quarter 2015 earnings call forecasted growth in line with the market for the coming year:  
19 “For 2016, for the whole year, the DRAM market bit growth, we expect mid-20%, and our bit  
20 growth is expected to grow align with the market.” Samsung also announced its plans to move  
21 away from its aggressive market share approach to focus “on maintaining our market leadership  
22 rather than own growth and continue to expand the sales of high value-added and differentiated  
23 products.”

24           81. On June 16, 2016, Micron’s CFO Ernie Maddock reassured analysts at the  
25 NASDAQ Investor Program Conference—in response to a question about Samsung’s “disruptive”  
26 behavior—that “this idea that there is a general reduction in DRAM CapEx planned by our Korean  
27 competitors and that we believe is very consistent with other messages that we’re hearing in the  
28

1 marketplace. So am I concerned? We're always concerned. Do we believe that that disruptive  
2 behavior is a high likelihood? It just doesn't feel as if that's the case right now."

3 82. From June 2016 onwards, DRAM prices increased, yet each Defendant limited bit  
4 growth by not adding significant wafer capacity and consistently communicated their plans to  
5 grow in line with the market rather than pursuing market share.

6 83. On Micron's June 30, 2016 third quarter earnings call, Mark Durcan stated "[i]n  
7 light of current market conditions, we have no plans to add DRAM wafer capacity."

8 84. On SK Hynix's July 21, 2016 second quarter earnings call, SK Hynix stated,  
9 "DRAM bit shipment growth is expected to be in the high single digit in the third quarter, which  
10 will make the shipment growth for the year to be low to mid 20%, in line with market growth."

11 85. Just seven days later, at its July 28, 2016 earnings call, Samsung reiterated its plan  
12 to grow in line with the market, predicting very similar growth to SK Hynix: "For the third quarter,  
13 we expect the DRAM market bit growth to be mid-teens and we will grow along with the market.  
14 And at this point, we expect 2016 DRAM market bit growth to be mid-20%, and we will grow in  
15 line with the market."

16 86. Industry analysts noted "a sudden market upturn began in the second half of" 2016.  
17 "To a large extent, the chip market is booming more than expected thanks to a sustained surge in  
18 memory chip pricing driven by tight supply. IC Insights said the DRAM market is now expected to  
19 grow by 55 percent this year, while the market for NAND flash is now expected to grow by 35  
20 percent. In both cases, the sales increases are being driven almost entirely by price increases rather  
21 than unit growth."

22 87. At the Citi Global Technology Conference on September 8, 2016, Micron CFO  
23 Ernie Maddock noted: "there are again an increasing number of data points to suggest that you're  
24 going to see very little wafer addition, if any." When asked if Micron would change their supply  
25 plans in response to improving demand, Maddock reiterated their commitment to the common  
26 plan: "Well, I mean we have basically announced what we intend to do in terms of bit growth and  
27 we're sticking to that." In response to a question as to whether he foresaw any of the producers  
28 increasing wafer capacity, Maddock noted:

1 While I would love to tell you that our competitors have sent us a memo telling us  
2 what their expansion plans are, unfortunately I can't report that, but certainly we  
3 read the same thing that each of you read and it does suggest that the focus of  
4 capital spend in 2017 is going to be NAND as opposed to DRAM on the part of  
5 many folks in the competitors face. And as I mentioned, we would expect all of  
6 our bit growth to come from technology transition as opposed to any sort of wafer  
7 expansion. There have been some pretty dramatic things published which I won't  
8 repeat here relative to potentially what's going on with some of our competitors  
9 and how they're choosing to use their productive capacity, but there's no sign  
10 anywhere in the market that suggests there's a plan to expand DRAM wafer  
11 capacity.

12 88. By October 2016, Micron was reporting "better-than-expected" fourth quarter  
13 revenue. Analysts noted that "[w]ith DRAM prices rebounding to 7 month highs, Micron is  
14 benefiting as the supply glut in the market has dried up following aggressive cut backs in  
15 production amid signs of a bounce back in demand." Micron's Durcan said, "We are seeing  
16 marketing conditions in terms of both slowing supply growth and improving demand across key  
17 segments."

18 89. On Micron's October 4, 2016 earnings call, Durcan noted:

19 We've seen further evidence that DRAM wafer output is declining as a result of  
20 lost throughput related to the 20-nanometer and 1X nanometer conversions.  
21 Absent some replacement of these wafers, we could see industry supply growth as  
22 low as mid-teens in 2017. As some of lost wafer output is replaced, industry  
23 supply growth could be in the high-teens percent range. This compares to our  
24 long-term bit demand growth forecast in the low to mid 20% range.

25 Given this, Durcan further stated that Micron felt "pretty good about where [it sat] given  
26 trends in the marketplace" and that it did not "feel quite as much urgency as we might under  
27 different market conditions.

28 90. In its October 27, 2016 earnings call, Samsung again noted that its bit growth rates  
would "be in line with market bit growth in DRAM next year. Once again, as we have always  
mentioned, regarding DRAM, our focus is not to increase our market share but to maximize our  
profits." In response to a question on the potential to add wafer capacity, Samsung reiterated its  
position: "Regarding the DRAM, once again, our bit growth will be focused more on process  
migration. And so as we have mentioned, we will be focusing on quickly and flexibly responding  
to the market environment as it unfolds." Reiterating again, in response to another question, "And  
once again, in terms of our DRAM business, our basic approach [is] that we will be more

1 profitability-oriented than market share-oriented and we plan to next year, at this point, expect to  
2 grow at market level.”

3 91. In response to investor questions regarding investment and capacity plans for  
4 DRAM, Samsung reiterated that although they would be executing “supplementary investment on  
5 the remaining space of Line 17,” “this is not to increase capacity, but to supplement and make up  
6 for the natural capacity decrease that we experience as we migrate towards 1X.” Continuing,  
7 “Currently we have no plans of increase – or adding a DRAM capacity to the Pyeongtaek  
8 campus.”

9 92. At the Credit Suisse Technology Media & Telecom Conference on November 29,  
10 2016, Ernie Maddock, Micron’s CFO noted:

11 I think a lot of that confidence goes back to the fundamental view of this supply  
12 and this demand. With no way for additions, we are increasingly present that you  
13 are going to see this supply grow, at something less than 20%, and even with  
some room for error on the DRAM with demand side, we still see a number there  
north of 20%.

14 He continued “our objective is to close the gap and make it as narrow as reasonable without doing  
15 anything that would potentially be disruptive to our performance or the industry’s performance.”

16 93. At the Barclays Technology Conference on December 7, 2016, Micron’s Maddock  
17 recognized the change in Samsung’s behavior, noting that the “absence of capacity additions”  
18 meant the industry was now “back into this fundamentally healthier period.” Maddock also  
19 forecast that supply would grow slower than demand: “So as we look at the supply side of the  
20 house, somewhat between 15% and 20% supply growth coming from these technology transitions  
21 and that is against a demand environment that we think is going to grow somewhere in the range of  
22 20% to 25% on a bip basis.”

23 94. On Micron’s earnings call on December 21, 2016, Micron’s Durcan differentiated  
24 the current situation from that seen in 2014 and indicated that Samsung had learned from its  
25 mistakes in 2014: “Well I think that part of what happened in the last latter stages of the last cycle  
26 where perhaps a little bit a miscalculation by one of the suppliers, but that they probably learned  
27 from so there is that.” He continued that Micron “had no plans to add new wafers this year.” In  
28 response to investor questions concerning additional capacity, he noted:

1 We don't have great crystal ball as to where our competitors are doing. We read  
2 the same reports that you guys read. All of that plus all the other internal  
3 intelligence we can generate that baked into our ranges and in the data sheet that  
4 we provided. So I think there has been some chatter recently potentially about few  
5 incremental wafers from one of the suppliers. Our view of that is if that were to  
6 happen, it's a relatively minor adjustment in terms of the overall scope of the bit  
7 growth that we're projecting and it would probably not cause us to change that  
8 range that we've giving you.

9 Durcan further stated that "[f]or the industry, supply is slowing, demand is stronger on a  
10 number of key segments, and inventory is at low levels."

11 95. Industry analysts noted in early 2017 that while the global increase in DRAM bit  
12 demand was expected to surpass 20% in 2017, global DRAM bit supply—which is almost entirely  
13 controlled by Defendants—was expected to grow by just 19% in 2017.

14 96. At the Needham Growth Conference on January 10, 2017, Micron's CFO Ernie  
15 Maddock, discussed Micron's confidence that its competitors would not increase supply: "I think  
16 their comments need to stand on their own and their comment seems to suggest a rational approach  
17 to addressing the supply/demand constraints of the DRAM market." Maddock repeated Micron's  
18 commitment to the common plan: "Our review of the DRAM business is that there will be  
19 somewhere between 15% and 20% bit supply from Micron and all the other participants in the  
20 industry. And then from a demand point of view, we think demand is going to be somewhere a  
21 little bit north of 20%, so somewhere between 20% and 25%."

22 97. At its fourth quarter earnings call for 2016, Samsung again committed to limit its bit  
23 growth in line with the market: "For Q1 2017, we expect the DRAM market bit growth to decline  
24 high single digit and our bit growth will decline low-teens. For 2017, whole year, we expect year-  
25 end bit growth to be high-teens and our bit growth will be similar level." In response to an investor  
26 question concerning Samsung's ability to boost capacity, Samsung reiterated its focus on  
27 technology migration, explaining:

28 We believe we are able to cover the current market demand through our  
technology migration. So that is why we will be maintaining our operation  
flexibly and try to cover the market demand within our technology migration. So,  
given the size as well as the lead time necessary for increase of DRAM capacity,  
we believe that temporary increase of DRAM supply is not very easy.



1           98.     Concerning its capacity plans, Samsung stated that it would take a “step by step”  
2 approach and emphasized it would be “monitoring the market situations as well as the  
3 competitors.”

4           99.     On January 25, 2017, SK Hynix announced its plans for “a DRAM bit shipment  
5 growth that is on par with the market for this year.” SK Hynix similarly warned that “DRAM chip  
6 supply growth may not keep up with demand.”

7           100.    SK Hynix also announced on its fourth quarter earnings call on January 25, 2017  
8 that “prices rose sharply for both DRAM and NAND as market improvement continued from the  
9 second half of last year” and “profitability improved significantly across all products, thanks to  
10 rising prices.” Regarding DRAM bit growth, however, SK Hynix stated that “throughout the first  
11 half of this year supply is not going to meet the demand which remains very strong[.]”

12           101.    On February 1, 2017, Moody’s Senior Analyst and Vice President, Gloria Tsuen,  
13 supported SK Hynix’s positive rating outlook, noting that “SK Hynix’s 4Q 2016 results continued  
14 to show pricing recovery in DRAM, amid strong demand and disciplined industry supply.”

15           102.    In March 2017, Micron’s Durcan spoke to a reporter for Barron’s about supply  
16 levels:

17           Durcan said in response to my question of whether a whole bunch of new supply  
18 will enter the market, “We don’t see that happening right now.”

19           “As best we can tell, when we put all that we know in our own model, there is not  
20 a big new wave of supply coming.”

21           Of course, “Further out, you get less certainty,” he conceded, “because people can  
22 add wafers, but right now, there are fairly long lead times on equipment, so that’s  
23 not going to happen any time soon.”

24           He added, “There are not enough new wafers coming to create oversupply.”

25           103.    On March 9, 2017, Micron’s Maddock reiterated the same growth forecast of “15%  
26 to 20% bit growth in supply and 20%, 25% sort of intrinsic demand growth” at the Susquehanna  
27 Semi, Storage, & Technology Conference. Maddock noted, “But at the end of the day, it has  
28 typically not been Micron who has expanded industry capacity when the margin profile upgrade . .  
all of the statements and all of the actions thus far suggest the things may indeed different in  
terms of how the participants are thinking about, the balance of profitability versus market share.”



1 Maddock reiterated that Micron is “public about the fact that we have no current plan to add  
2 wafers in any form.”

3 104. On March 23, 2017, Micron also reiterated an industry-wide forecast of bit supply  
4 growth between 15-20% and demand growth between 20-25%: “It’s still, in our view, it’s 15% to  
5 20% supply growth this year, could actually be less than that if there’s less new wafers than we  
6 have in our plan. Demand is still 20% plus.” In response to a question as to whether Micron would  
7 add wafer capacity because of “such strong pricing out there in the market,” Micron’s Durcan  
8 responded: “We’re not focused on adding more supply . . . We do have white space in both our  
9 Fab 16 in Taichung as well as Fab 10X, but we’re not planning any capacity additions this year.”  
10 In response to a question concerning Samsung expanding supply, Durcan explained:

11 Again, I think the last cycle was a little different with that instability in supply  
12 created by the Hynix fire. I don’t know why they would intentionally repeat the  
13 mistake from last cycle. They probably are enjoying making good margins . . .  
14 Samsung is actually probably on the low end over the next couple of years  
relative to what’s going on in the industry as a whole. And the industry as a whole  
is probably a little bit south of where we think demand growth is.

15 105. On its April 24, 2017, first-quarter earnings call, SK Hynix reiterated that “the  
16 current projection for about 20% level growth is also based on the assessment of . . . all of the  
17 factors.” SK Hynix further stated that DRAM demand growth was “expected to outpace supply  
18 growth” and that “[t]here is not enough clean room space to significantly increase DRAM  
19 capacity[.]” As part of this market outlook, SK Hynix explained that it believed “that the supply  
20 shortage will continue to the end of this year.”

21 106. At Samsung’s first quarter earnings call for 2017 on April 27, 2017, Samsung  
22 confirmed its plan for its DRAM bit growth to be “aligned with the market.” “For DRAM in Q1,  
23 our bit growth declined low-teens, while ASP increased low-20%. For second quarter, we expect  
24 DRAM market bit growth to be mid-single digit increase and we expect our DRAM bit growth in  
25 second quarter to be high-single digit. And for the year, we expect DRAM market bit growth to be  
26 high-teens and we expect to grow in line with the market.” Again, in response to investor questions  
27 about capacity, Samsung repeated that “we have no plans of additional capacity,” other than to  
28 “make up for the loss that happens as we migrate to the 1X.” Samsung noted, “[W]e’ve always had

1 a very flexible capacity operation that optimizes the capacity for each product depending on the  
2 market situation that unfolds.”

3 107. In response to investor questions concerning the threat from Chinese manufacturers  
4 entering the DRAM market, Samsung stated that the memory market “it’s now protected by quite a  
5 high entry barrier, because memory business today requires not only the very cutting-edge  
6 processors migrated, but also needs to have various high value-add solutions to go with the  
7 products.”

8 108. On May 24, 2017, at the JP Morgan Global Internet, Media and Technology  
9 Brokers Conference, Micron’s Maddock noted that Micron and its competitors—unlike previous  
10 years—were being careful not to add supply: “if you listen to the commentary coming from  
11 industry participants on the supply side it reflects a great deal of discipline and thoughtfulness with  
12 respect to how the industry participants are considering supply expansion . . . Although we don’t  
13 speak for the industry, the other participants have spoken and indicated a great deal of discipline.”  
14 Micron reiterated supply growth that matched that of its competitors: “on the DRAM side you’re  
15 going to see somewhere between 15% and 20% growth in bits supplied, that’s something that the  
16 other suppliers in the market are also saying, within reasonable range.” Micron also flagged that its  
17 plans to avoid adding wafer capacity were consistent with its competitors:

18 I think that’s reasonably consistent with certainly what we’ve said about our  
19 intent, and then certainly the public comments of the other industry participants  
20 have been pretty much exactly that. That while you do get some wafer loss as a  
21 result of technology transitions, the intent that we have is to maintain flat wafer  
22 outs, so essentially you are adding a little bit of capacity to make up for those lost  
23 wafer outs, but as an industry as a whole, you are not adding substantial  
24 incremental industry wafers and that would contribute to or allow you to get into  
25 this 15% to 20% range in terms of bit growth.

26 109. On June 6, 2017, at the Bank of America Merrill Lynch 2017 Global Technology  
27 Conference, Micron’s Maddock noted the consistent approach taken to limit supply across the  
28 industry:

29 And we feel that from a larger perspective over the course of a multi-year period,  
30 it feels as very much as if you’ll have good balance between supply and demand  
31 as long as capital discipline is exercised. And certainly Micron has indicated the  
32 difference to be reasonably disciplined with its capital investments, and other  
33 industry competitors in their particular public disclosure[s] have said similar  
34 things.

1           110. In response to questions as to how Micron expected competitors to act in the  
2 improved industry circumstances, Micron noted:

3           I can say our view of industry bit demand will have to be materially different than  
4 in the peers to be today to begin to have a think about expanding capacity well  
5 beyond where we are thinking today which is predominantly to get that capacity  
6 through technology transition . . . I don't think our view of how we look at the  
7 industry is very – very different than how other rational smart people sitting and  
8 other competitors tend to look at the industry.

9           111. At the Robert W. Baird Global Consumer Technology conference on June 8, 2017,  
10 Micron's Maddock noted:

11           [T]here has actually been much more disciplined behavior on the part of the  
12 remaining industry participants, of which there are now only 3, it's Micron,  
13 Samsung and Hynix. And so while each of us is assessing the market, looking at  
14 the market, I think there's great consistency between suppliers relative to our  
15 view of market growth opportunities on the demand side. And what you see being  
16 exercised today is disciplined investment around expansion of capacity relative to  
17 expansion of demand. And each one of us has made our own independent  
18 comments on what we think makes sense for our particular company. In Micron's  
19 case, we said that we have no plans for additional new wafer fab capacity that we  
20 will get the bits that we require to serve the market from technology transitions.

21           112. On Micron's June 29, 2017 earnings call, Micron President, CEO, and Director  
22 Sanjay Mehrota noted Micron's position that "for calendar 2017, we expect DRAM industry bit  
23 supply growth of between 15% and 20%, slightly below our view of demand growth." In response  
24 to a question regarding Micron's views on adding more DRAM wafer capacity, Mehrota reiterated  
25 Micron would focus on technology transitions instead of increasing capacity: "In terms of any new  
26 capacity, I mean, we would certainly have to first make sure that we have captured the maximum  
27 potential of our technology transition capability in manufacturing. And then we'll have to certainly  
28 see that there is sustained projection or sustained demand growth in the years ahead before we  
consider adding new capacity."

1           113. At SK Hynix's second quarter earnings call on July 24, 2017, SK Hynix similarly  
2 stated its plan for DRAM bit shipment at "low 20% on par with the market." It further signaled to  
3 the industry its intention to increase capacity, saying, "for both DRAM and NAND, there is some  
4 capacity increase planned within this year, especially because for DRAM . . . we cannot meet the  
5 growing market demand only with technology migration[.]"

1           114. At Samsung's earnings call on July 27, 2017, Samsung again stated its plan to keep  
 2 its bit growth aligned with the market growth. "In the third quarter, we expect market DRAM bit  
 3 growth to be high-single digit, and we expect our DRAM bit growth to be low-teens. And for the  
 4 year, we expect the DRAM market bit growth to be high-teens, and we expect our bit growth to be  
 5 aligned with the market growth." Samsung recognized that "[d]ue to restriction of industry supply,  
 6 supply and demand remained solid and price continued to rise." In response to investor questions,  
 7 Samsung reiterated again, that in contrast to its pre-Class Period aggressive market share focus,  
 8 "we will refrain from, for example, increasing market share, fighting on volume. . . . we will  
 9 flexibly manage our capacity by very closely monitoring the market situation, as well as the supply  
 10 and demand balance."

11           115. On August 7, 2017, Micron's Mehrota repeated the same gap between supply and  
 12 demand at the KeyBanc Capital Markets Annual Global Technology Leadership Forum  
 13 Conference:

14           Overall bit supply in the industry is in 15% to 20% range. And when you look at  
 15 the bit supply growth perhaps, may be a little bit toward the higher end of that  
 16 15% to 20% range. But, the demand projection, again, from all the mega markets  
 17 that I earlier talked about, point to greater than 20% demand for the industry. So, I  
 do believe that for 2017 and heading into 2018 as well, the industry fundamentals  
 will be healthy.

18           116. At the Citi 2017 Global Technology Conference on September 6, 2017, Micron  
 19 CFO Ernie Maddock recognized the importance of consolidation to limiting the increase in  
 20 capacity and reassured investors that this supply discipline would continue into 2018:

21           Relative to the supply side, I do think consolidation has been very instrumental in  
 22 having a disciplined and orderly expansion of supply. We have certainly seen that  
 23 now over period of a couple of years and we expect based on everything that we  
 can see that you're going to continue to have a disciplined expansion of supply as  
 we look forward into fiscal '18 for Micron.

24           117. Maddock also reiterated the focus on keeping supply growth below demand growth:

25           Well, if you listen to the public commentary of the industry participants, the key  
 26 message across the Board is that the investments are mainly for technology  
 27 transition with the desire to keep wafer starts roughly flat . . . . But if you look at  
 28 that, that will allow the industry to grow bits at this 20% plus or minus range over  
 the course of any given year and certainly that feels very well matched to what we  
 believe the demand to grow from a supply point of view, which is in the 20% to  
 25% range.

1           118. On Micron’s fourth quarter 2017 earnings call on September 27, 2017, Micron told  
2 investors that it expected the “industry to remain moderately undersupplied for the rest of 2017 for  
3 . . . DRAM.” In response to questions as to when Micron would begin to outgrow the industry,  
4 Micron noted, “I would also tell you that our objective over a multiyear period is to grow at about  
5 industry levels . . . really important is the segment that we intend to grow aligned with industry  
6 over the course of these multiyear periods.”

7           119. Similarly, SK Hynix reported on its earnings call on October 16, 2017 that it  
8 intended to grow its DRAM capacity “on par with the market” in 2018, even though the DRAM  
9 market was in a state of undersupply.

10           120. On a third quarter earnings call on October 25, 2017, SK Hynix reiterated what its  
11 intended growth figures were for DRAM, saying, “the prediction is about mid-20% level, which is  
12 higher than our initial plan . . . [W]e are forecasting about low 20% or around 20% level of bit  
13 growth for DRAM next year . . . And for Hynix, we . . . foresee that we will be roughly in line with  
14 market growth.”

15           121. At Samsung’s earnings call on October 31, 2017, Samsung again signaled its plan  
16 to stay in line with the market.

17           For DRAM, in the third quarter, our bit growth came in high single-digit and our  
18 ASP grew high single-digit as well. For the Q4, we expect market DRAM bit  
19 growth to be low single-digit and we expect our growth to be similar. That will  
bring the 2017 market DRAM bit growth to be approximately 20% and our bit  
growth will be mid-teens.

20           Samsung again reiterated that it would maintain its “profit first rather than market share  
21 policy.” In response to investor questions, Samsung noted that its “basic approach to DRAM  
22 capacity management is that we will flexibly manage our capacity especially depending on the  
23 market situation for each product, as well as the migration in the 10-nano class process  
24 technology.” Samsung also noted that despite a prior decision “to convert part of Hwaseong  
25 NAND capacity to DRAM . . . because of the inefficiencies that are caused as a result of this  
26 conversion, we have actually decided to reduce the size of the NAND conversion to DRAM than  
27 originally planned and rather use part of the upper floor of Pyeongtaek for DRAM capacity.”  
28

1           122. When discussing Samsung's investments in their semiconductor business, Samsung  
2 again signaled its commitment to limiting capacity in the DRAM market, noting that "the  
3 investments we're making this year and next year in our Semiconductor business is not for  
4 immediate bit growth next year. We actually have a longer term horizon. We think that the  
5 investments that we're making now and next year is more for the overall business capabilities for  
6 the next two to three years."

7           123. In contrast to Samsung's pre-Class Period aggressive fight for market share, by  
8 2017 Samsung had lost market share, yet still focused on maintaining bit growth at market growth  
9 levels. In response to a direct investor question as to whether Samsung planned "to regain its  
10 previous market share next year or will you be more trying to maintain where you stand  
11 currently?" Samsung again reiterated its commitment to avoiding competition for market share:  
12 "the current guidance that we can give you is that for next year, our bit growth for DRAM is  
13 expected to be at market growth levels." The 'declining market shares of leaders' is a plus factor  
14 potentially indicative of cartel conduct. Samsung had the highest market share throughout this time  
15 period, yet it did not respond to the decline in its market share, focusing instead on growing at  
16 market growth levels.

17           124. At the Credit Suisse Annual Technology, Media & Telecom Conference on  
18 November 28, 2017, Micron's Mehrota repeated the industry approach to keep supply growth  
19 below demand growth: "For fiscal year '18, what we have said is, industry supply that growth 20%  
20 . . . while the demand trends I believe will continue to be somewhat stronger than that . . . there  
21 may be some wafer capacity additions but they will remain relatively small."

22           125. At the Nasdaq Investor Conference on December 6, 2017, Micron's Maddock  
23 stated:

24           We are not adding wafers for either technology in 2017. I think if you look at the  
25 public comments of other suppliers they are adding marginal numbers of wafers.  
26 But essentially if you look at the industry in aggregate even at the end of 2018 it's  
altogether possible for DRAM that the number of wafers the industry produces is  
the same or slightly less than it was some years ago.

27           Maddock noted in response to another question, "if you look at the public commentary of  
28 all the industry participants . . . I think there is a general belief that the industry participants are

1 keenly aware of the fact that the DRAM market is relatively inelastic and the way you serve that  
2 market is by making sure there is adequate, but not excess supply.” Maddock went on to also say  
3 “we think the industry for DRAM [*sic*] fairly healthy next year . . . we think supply is going to  
4 grow sort of in the midpoint of 20% with a small range around that demand, we think will be in  
5 that range or slightly higher that should create an opportunity for continued healthy industry  
6 conditions.”

7 126. By late 2017, in response to Chinese manufacturers looking to enter the market,  
8 reports indicated Samsung would soon increase capacity to lower prices and hurt the entry of  
9 Chinese competitors to the DRAM market. But at its earnings call on January 31, 2018, Samsung  
10 again signaled its expectation to align with the market in terms of bit growth:

11 In the fourth quarter, our DRAM bit growth came in low single-digit and we saw  
12 our ASP increase about 10%. In the first quarter, we expect the market DRAM bit  
13 growth to decline low single-digit and our bit growth will come in similar to that  
of the market. And for 2018, at this point, we expect the DRAM market bit  
growth to be about 20% and our bit growth will also come in similar level.

14 127. Samsung attributed the lack of capacity growth to “even though the industry has  
15 been working very hard to increase supply, there are difficulties because of the 10-nano class  
16 technology being very difficult. Also there are limits in terms of the cleanrooms that are available.”

17 128. Similarly, on its fourth quarter earnings call on January 24, 2018, SK Hynix stated  
18 that it expected DRAM demand “to grow at 20% level” and that “supply will remain tight despite  
19 higher investment across the industry[.]” Furthermore, this 20% growth would be “on par with  
20 market growth.” Additionally, SK Hynix acknowledged that restricting DRAM supply had led to  
21 rising DRAM prices, stating “the memory semiconductor market last year went through an  
22 unprecedented growth. Favorable market condition[s] continued throughout the year with supply  
23 remaining tight due to ever-rising technological complexity and growing investment burden for  
24 production.”

25 129. SK Hynix further stated on its first quarter earnings call on April 23, 2018 that  
26 “demand for DRAM is expected to grow by low 20% level this year. Supply growth will not be  
27 enough to ease the price supply situation, even if suppliers accelerate their migration to 1X nano  
28 and continue to add wafer capacity by increasing investment.” SK Hynix described this growth



1 plan as “in line with market growth for both DRAM and NAND.” In response to specific questions  
2 about capacity increase across the market and concerns for oversupply, SK Hynix stated that the  
3 previous year’s “limited bit growth in DRAM supply [was] because of the continuing tech  
4 migration.” Furthermore, SK Hynix believed that although price was “going to ease a bit . . . tight  
5 supply will continue.”

6 130. On its first quarter earnings call on April 26, 2018, Samsung acknowledged that “in  
7 spite of industry effort to increase the supply, extending bit growth is more likely to be limited due  
8 to space constraint and increase in technology difficulty. Therefore, [the] DRAM market remain[s]  
9 to be tight continuously.” Samsung further reiterated that it tried “to avoid competing over market  
10 share and focus more on maintaining sustainable profitability and maintaining our capacity  
11 flexibility to achieve those aims.”

12 131. Samsung signaled its ongoing commitment to this strategy during its second quarter  
13 earnings call on July 31, 2018, explaining its “focus is on mid- to long-term profitability rather  
14 than short term growth in volume and size, and that strategy has not changed.” Samsung then  
15 noted that “despite the industry’s efforts to increase supply, we expect the industry situation to  
16 remain solid because . . . it would not be easy for the increase in supply to catch up with the  
17 growth in demand.”

18 132. On its fourth quarter earnings call on September 20, 2018, Micron reaffirmed that  
19 as it “mentioned that [in] calendar year ’19, we see our supply bit growth in line with the industry  
20 on DRAM side, which we expect to be approximately 20%.”

21 133. SK Hynix reported on its third quarter earnings call on October 25, 2018 that “the  
22 severe supply shortage has begun to ease following DRAM makers’ efforts to meet demand  
23 growth through supply.” This led SK Hynix to announce that it “will now focus on improving  
24 investment efficiency,” as “there has been active investment with an eye toward easing the tight  
25 supply.”

26 134. Micron further signaled its intention for 2019, saying on its first quarter earnings  
27 call on December 18, 2018 that its “seeing weakening demand” from customers and as a result,  
28 “taking decisive actions, including a meaningful reduction in our fiscal 2019 CapEx plan, in both



DRAM and NAND that will materially reduce our supply bit growth.” Micron went to specify that it would be lowering “DRAM bit output growth to approximately 15% for calendar year 2019 versus our prior plan of around 20% bit growth.”

**G. Defendants’ Conspiracy Was Successful – DRAM Revenue Grew 76% in 2017**

135. The conspiracy was successful. Global DRAM prices rose from June 2016, “on account of higher DRAM content in mobile devices and significant under-supply of PC DRAM and a slowdown in capacity expansions.” According to reports, DRAM revenue grew 76% in 2017, with Samsung reporting a total of \$10.1 billion in DRAM revenue for the fourth quarter of 2017. SK Hynix reported fourth quarter DRAM revenue of \$6.3 billion, while Micron reported \$4.6 billion in DRAM revenue for the same period. Industry reports credited this “near-historic high market spike” to “a lack of major fab expansion plans, yield difficulties with leading-edge . . . processes, demand for high performance (graphics) DRAM from gaming systems and data center-based server applications, and increased average content for mobile DRAM used in smartphones.” Industry reports noted that “most PC OEMs negotiated first quarter DRAM contracts at the end of 2016, when DRAM was in tight supply. Not only did these price increases affect PC DRAM but they also spilled over into the server and mobile DRAM markets, increasing the price of mobile DRAM products by nearly 10 percent on average[.]”

136. As the prices for DRAM increased, Defendants’ revenue soared, rising more than 50% during the Class Period. Between the first quarter and 2016 and third quarter of 2017, Defendants’ revenues from global DRAM sales more than doubled. In the third quarter of 2017, Samsung achieved a record-high revenue of \$8.7 billion from its global DRAM sales (Q1 2016 revenue was \$3.9 billion); SK Hynix achieved record-high revenue of \$5.5 billion from its global DRAM sales (Q1 2016 revenue was \$2.3 billion), and Micron achieved record-high revenue of \$4.0 billion from its global DRAM sales (Q1 2016 revenue was \$1.5 billion). In Q1 2018, all these top three suppliers have pushed their respective operating margins to 50-70%, the highest recorded in the history of their companies.

**H. Chinese Regulators Began Investigating the DRAM Industry in Late 2017**

137. By late December 2017, foreign regulators had started to investigate the DRAM industry.

138. On December 26, 2017, concerning the DRAM industry, an official from China's National Development and Reform Commission ("NDRC") Pricing Supervision Department stated to the China Daily newspaper, "We have noticed the price surge [in the last 18 months] and will pay more attention to future problems that may be caused by 'price fixing' in the sector." On February 1, 2018, Samsung and the NDRC reportedly entered a Memorandum of Understanding where Samsung agreed to increase manufacturing capacity.

139. In April 2018, SK Hynix publicly announced that it was adding wafer capacity by 6-7% per year to meet demand growth.

140. On May 24, 2018, antitrust officials from China's Anti-Monopoly Bureau of the Ministry of Commerce met with Micron to "express concerns" about continued price increases for PC DRAM products.

141. China's State Administration for Market Regulation ("SAMR")<sup>2</sup> carried out surprise inspections of Samsung, SK Hynix, and Micron, at their Beijing, Shanghai, and Shenzhen offices on or around May 31, 2018.

142. On June 1, 2018, Bloomberg News reported that Micron had confirmed it is cooperating with SAMR, who visited Micron's China sales offices on May 31, 2018.

143. On June 4, 2018, Bloomberg News reported that Samsung had confirmed that investigators from China's regulatory agency visited their Chinese sales office on May 31, 2018. SK Hynix said separately it was being investigated by China's government and was cooperating.

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<sup>2</sup> In March 2018, the Chinese government consolidated the duties of its three competition agencies into a new government agency to handle all antitrust matters. The NDRC was responsible for investigating price related monopoly agreements, abuse of dominance, and abuse of administrative power. The State Administration for Industry and Commerce ("SAIC") was in charge of investigations into non-price related monopoly agreements and abuse. The Ministry of Commerce ("MOFCOM") handled merger control filings. The NDRC, SAIC, and MOFCOM were all consolidated into a new government agency, SAMR, the agency that raided the Defendants' offices.

1 South Korean media reported that China was accusing the Defendants of colluding with each other  
2 to hike memory chip prices.

3 144. On June 27, 2018, Chinese media reported that SAMR raided DRAMeXchange's  
4 Chinese offices.

5 145. In November 2018, the head of China's anti-monopoly bureau under SAMR, Wu  
6 Zhenguo, announced that the investigation into manufacturers of DRAM memory chips had made  
7 important progress and that a large amount of evidence had been obtained. Having officially  
8 launched the probe at the end of May 2018, the regulator has already amassed a significant amount  
9 of evidence from the three companies, Wu told a press conference. The agency has obtained and  
10 screened evidence from these companies and their downstream partners; the next step is to focus  
11 on how to define the case itself, the companies' market dominance position as well as their  
12 relevant practices.<sup>3</sup>

### 13 I. Trade Associations Provided Further Opportunities for Defendants to 14 Conspire

15 146. Trade associations provided opportunities for Defendants to meet frequently and  
16 exchange information to facilitate collusion. Defendants are members of several trade associations  
17 in the United States, Asia and Europe. Their common membership in trade associations also  
18 provided an incentive for Defendants to adhere to their agreements, as they could monitor one  
19 another's activities in the DRAM market and punish non-compliance. Defendants' participation in  
20 trade associations, as described below, helped facilitate their collusion.

21 147. **Semiconductor Industry Association ("SIA"):** SIA is an association for the U.S.  
22 semiconductor industry. Micron is a member of SIA, along with other U.S. semiconductor  
23 manufacturers. Samsung and SK Hynix are listed as international members. Micron's President  
24 and CEO Sanjay Mehrotra is on the Board of SIA. The U.S. based SIA is affiliated with branches  
25 in other regions of the world including in Korea, Japan, China, and Europe. It is also linked to the  
26

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27 <sup>3</sup> Antitrust officials: All firms treated equally, The State Council, the People's Republic of China,  
28 *available at*  
[http://english.www.gov.cn/state\\_council/ministries/2018/11/17/content\\_281476393933442.htm](http://english.www.gov.cn/state_council/ministries/2018/11/17/content_281476393933442.htm)  
(last visited Oct. 28, 2019).

1 World Semiconductor Trade Statistics Organization and the World Semiconductor Council.  
2 Defendants belong to all these associations.

3 148. SIA holds various events, such as its “Annual Award Dinner” which Defendants’  
4 key executives attend. For example, at its annual dinner on November 14, 2017, Micron’s then-  
5 CEO Mark Durcan was featured as an award winner and potential speaker. The program of events  
6 for the November 14, 2017 meeting also included a CEO Reception and a Post-Party, providing  
7 further opportunities for social interaction or side conversations among members.

8 149. **Korean Semiconductor Industry Association (“KSIA”)**: Like SIA, KSIA  
9 provides opportunities for the Defendants to be in contact and to directly communicate and share  
10 competitive information with one another.

11 150. KSIA’s membership list includes both SK Hynix and Samsung on its device  
12 manufacturer member list, with only four other entities listed as device manufacturer members.  
13 This small number of member companies makes it possible for members to be in contact and  
14 exchange information.

15 151. In March 2016, Sung Wook Park, the CEO and Vice Chairman of SK Hynix was  
16 inducted into the leadership of KSIA.

17 152. The KSIA Board of Directors includes Samsung’s Jin Kyo Jin and SK Hynix’s Lee  
18 Suk-hee as Chairman and Vice Chairman, respectively.

19 153. KSIA also holds events and conferences for its members. For example, KSIA holds  
20 an annual meeting each year. SK Hynix has been noted as one of the event organizers for, at least,  
21 the 2016 annual meeting.

22 154. On October 17, 2017, the KSIA announced the 19<sup>th</sup> SEDEX (Semiconductor  
23 Exhibition) at COEX in Seoul. In attendance were employees from Samsung and SK Hynix.

24 155. On October 26, 2017, the SKIA held its 10<sup>th</sup> Semiconductor Day commemoration  
25 ceremony in Seoul. The event commemorated the Joint Declaration of Win-Win Cooperation to  
26 Strengthen the Semiconductor Industry Ecosystem and was attended by Jin Kyo-young of  
27 Samsung and then Vice Chairman of the KSIA Park Sung-wook of SK Hynix.

1           156. On October 24, 2018, the KSIA announced that the 20<sup>th</sup> SEDEX (Semiconductor  
2 Exhibition) was held at COEX in Seoul. In attendance were employees from Samsung and SK  
3 Hynix.

4           157. In February 2019, senior executives from SK Hynix and Samsung attended one of  
5 the KSIA's Regular Seminar Meetings.

6           158. KSIA is connected to SIA and other country-specific branch organizations. At  
7 times, the various country affiliates gather for worldwide conferences and events, providing further  
8 opportunities for Defendants to join in person.

9           159. While much of the information on these organizations is kept private for members  
10 only, these organizations clearly provide a channel through which Defendants had the opportunity  
11 to discuss and/or exchange information directly during the Class Period.

12           160. **World Semiconductor Council ("WSC"):** The World Semiconductor Council  
13 "promotes international cooperation in the semiconductor sector in order to facilitate the healthy  
14 growth of the industry from a long-term global perspective." WSC holds at least one meeting a  
15 year. For example, in May 2018, it held its World Semiconductor Council Meeting for WSC  
16 members only in Coronado, California. Notably, WSC held a meeting of over 100 CEOs and other  
17 semiconductor executives on May 26, 2016 (a few days before the start of the Class Period on June  
18 1, 2016). The conference was led by Sung Wook Park (CEO of SK Hynix and held leadership in  
19 KSIA), who was chairman of the KSIA at the time. That WSC was also attended by Jun Young-  
20 Hyun (President of Semiconductor Memory Business at Samsung Electronics) and Synn Seung-  
21 Kook (SVP at SK Hynix). Synn was also KSIA's chairman and representative at the 2017 and  
22 2018 WSC. Note also that for the 2015 WSC in China, the KSIA was chaired and represented by Ji  
23 Hyun-ki, a director at Samsung Electronics in charge of planning for the memory business.

24           161. **World Semiconductor Trade Statistics Organization ("WSTS"):** Defendants  
25 also participate in WSTS, a non-profit, which provides semiconductor market data and forecasts.  
26 WSTS compiles monthly sales numbers for the semiconductor industry, including DRAM, and  
27 provides twice yearly semiconductor industry forecasts with quarterly and annual projections. A  
28 subscription to the WSTS Database also includes statistics on Semiconductor Capacity Utilization

1 (known as SICAS Reports). WSTS is primarily funded by membership fees of participating  
2 semiconductor companies, whose representatives form the WSTS Committee. The members of this  
3 Committee submit accurate and authentic monthly revenue data, attend regional meetings, and  
4 contribute to the generation of world semiconductor industry forecasts.

5 162. Semiconductor companies that seek to be WSTS members must agree to provide  
6 member company revenue data and pay membership fees. Members then can access all the  
7 information that WSTS provides. If a company is unable to provide revenue data into the WSTS  
8 statistics program, it can buy access as a subscriber.

9 163. All three Defendants are members of WSTS. Micron is a member of the Americas  
10 Regional Group, and Samsung and SK Hynix are members of the Asia Pacific Regional Group.

11 164. Several partners support WSTS in the operation of market statistics information  
12 services. Data Collection Agents (“DCAs”) receive the revenue data from WSTS member  
13 companies and keep this data under their custody. WSTS has appointed regional DCAs who  
14 collect revenue data from member companies and consolidate this data into the regional base  
15 report. Regional DCAs forward the regional base report at defined dates to the worldwide DCA.  
16 The worldwide DCA consolidates all the data of the regional base reports and merges this data  
17 with non-participant estimates that are provided by WSTS. DCAs are also responsible for checking  
18 the submitted data for completeness, consistency and plausibility. They resolve any perceived data  
19 anomalies with the submitting member companies. Finally, the worldwide DCA posts these data  
20 compilations under the name of the various market statistics reports on the WSTS Internet Portal.

21 165. Semiconductor Industry Associations in the different regions closely cooperate with  
22 WSTS. In most cases they also hold distribution licenses for WSTS market statistics reports and  
23 forecasts to serve interested parties outside the WSTS membership.

24 166. In addition, WSTS holds meetings for its members. For example, it will hold its  
25 spring 2018 Committee Meeting in Vienna, Austria. As explained on its meeting registration page,  
26 “each WSTS Member Company has one official representative in the Committee, who is expected  
27 to participate in the Committee Meeting.” Participation in the Forecast Meeting is subject to the  
28 submission of a pre-meeting forecast. The process includes companies submitting their forecast

1 information and then publication of the pre-meeting average forecast to all participating  
2 companies.

3 167. WSTS describes the value of its regular meetings as “an important venue for  
4 members to help shape forecasts and future reports, and to interact with their industry peers. . . .  
5 Members are able to exchange experiences with other market participants, gain important  
6 information about current market sentiment, and hear directly from their peers how they view the  
7 future direction of the market.”

8 168. WSTS holds a number of different types of meetings for members, including: Board  
9 of Directors Meetings (at least twice a year); Executive Committee Meetings, including the World  
10 Chairman and the five Regional Chairs (at least twice a year); Working Group Meetings where  
11 certain WSTS members gather in regional or sector-specific groups; Committee Meetings where  
12 members’ primary focus is to review the current situation in the semiconductor market and to  
13 formulate forecasts for the upcoming quarters and following two years (twice a year); and  
14 Regional Chapter Meetings (two to four times per year).

15 169. **Global Semiconductor Alliance (“GSA”)**: GSA represents about 350 member  
16 companies, including Micron, Samsung, and SK Hynix. GSA holds a Memory Conference once  
17 every two years. For example, the conference was held in March 2015 and June 2017. GSA also  
18 holds an annual U.S. Executive Forum conference in September or October, an annual European  
19 Executive Forum in April, May, or June, and an Annual Awards Dinner in December.

20 170. The GSA’s Board of Directors includes Naga Chandrasekaran, SVP at Micron, and  
21 DR. JS Choi, President of Samsung Semiconductor, Inc. GSA’s Asia-Pacific Leadership Council  
22 includes Dr. JS Choi and Dr. Sung-Wook Park, Vice Chairman of SK Hynix.

23 171. At the June 2017 GSA Memory Conference in Shanghai, Brian Shirley, Micron’s  
24 VP of Memory Solutions, appeared as the keynote speaker. He further participated in a panel and  
25 was selected to give a presentation at the conference.

26 172. **SEMI International Technology Partners Conference (“ITPC”)**: The ITPC, is  
27 an annual industry gathering of executives in the semiconductor and microelectronics  
28 manufacturing industry.



1           173. In 2014, the ITPC attendee list included Mark Adams, President of Micron  
2 Technology, and Sung Wook-Park, President and CEO of SK Hynix.

3           174. In 2016, the ITPC attendee list included Micron's Norm Armour and Samsung's  
4 Ho-Kyu Kang.

5           175. In 2017, the ITPC attendee list included Samsung's Seok Woo Nam and SK  
6 Hynix's Seok-Hee Lee.

7           176. In 2018, the ITPC attendee list included Jong Hoon Oh, Senior VP and GM for  
8 DRAM development at SK Hynix.

9           177. The 2019 ITPC is scheduled for November 3-6, and the conference attendee list  
10 includes Micron's President and CEO Sanjay Mehrotra and Vice President and Samsung's Head of  
11 Memory Manufacturing Center Vice President Siyoung Choi, both of whom are scheduled to  
12 speak on November 3<sup>rd</sup>.

13           **J. The DRAM Industry Has A History of Collusive Activity**

14           178. The United States Department of Justice ("DOJ") brought criminal charges against  
15 the Defendants (and other makers of DRAM that existed at the time) in 2005, for conspiring to fix  
16 the prices of DRAM sold in the United States between 1999 and 2002. Samsung and SK Hynix<sup>4</sup>  
17 pleaded guilty to the DOJ's charges, paying some of the largest criminal fines in history for their  
18 illegal conduct. Micron also admitted to participating in the conspiracy but received amnesty from  
19 prosecution in exchange for its cooperation under the DOJ's Antitrust Corporate Leniency  
20 Program. The DOJ imposed a \$185 million criminal fine on SK Hynix in 2005, the fourth largest  
21 criminal antitrust fine at that time. That same year, Samsung agreed to plead guilty and paid a \$300  
22 million fine. Samsung's fine was the second largest criminal antitrust fine in U.S. history and the  
23 largest criminal fine imposed since 1999 at that time. Fourteen individual employees of  
24 Defendants also pleaded guilty for participating in the conspiracy. They paid fines of \$250,000  
25 each and served prison sentences ranging from seven to fourteen months. Some of Defendants'  
26 employees involved in the collusive acts of the last DRAM conspiracy still hold key leadership

27 \_\_\_\_\_  
28 <sup>4</sup> In 2005, at the time of the DOJ investigation, SK Hynix was known as Hynix Semiconductor Inc. For consistency, Plaintiff uses "SK Hynix" in this section, although the company did not change its name to SK Hynix until 2012.



positions with Defendants today. Defendants' previous convictions for conspiring to fix DRAM prices support the plausibility of the conspiracy alleged in this complaint.

179. The DOJ has also investigated Defendants for price fixing in similar semiconductor memory markets, including the markets for static random access memory ("SRAM") and NAND (generally referred to as "Flash"). Defendant Samsung and its wholly owned subsidiaries pleaded guilty in a number of other related electronic component price-fixing conspiracies.

**K. Additional Opportunities to Collude**

180. In 2013 and 2014, just prior to the start of the Class Period, SK Hynix hired three former Samsung executives, Lim Hyung-kyu, Suh Kwang-pyuk, and Oh Se-young.

181. Upon being hired, SK Hynix made these three individuals responsible for its semiconductor business.

182. At Samsung, Suh Kwang-pyuk served as Vice President of Samsung Electronics' system large-scale integrated circuit operations and Oh Se-young developed memory chips.

**L. The Economic Evidence is Consistent with the Existence of a Cartel**

183. The economic evidence also suggests the existence of collusion between the Defendants.

184. Economists commonly employ certain economic tests or "screens" to detect the existence of a cartel in each industry. The following tests or screens are commonly used by economists and supported by the relevant peer-reviewed publications as "collusion screens."

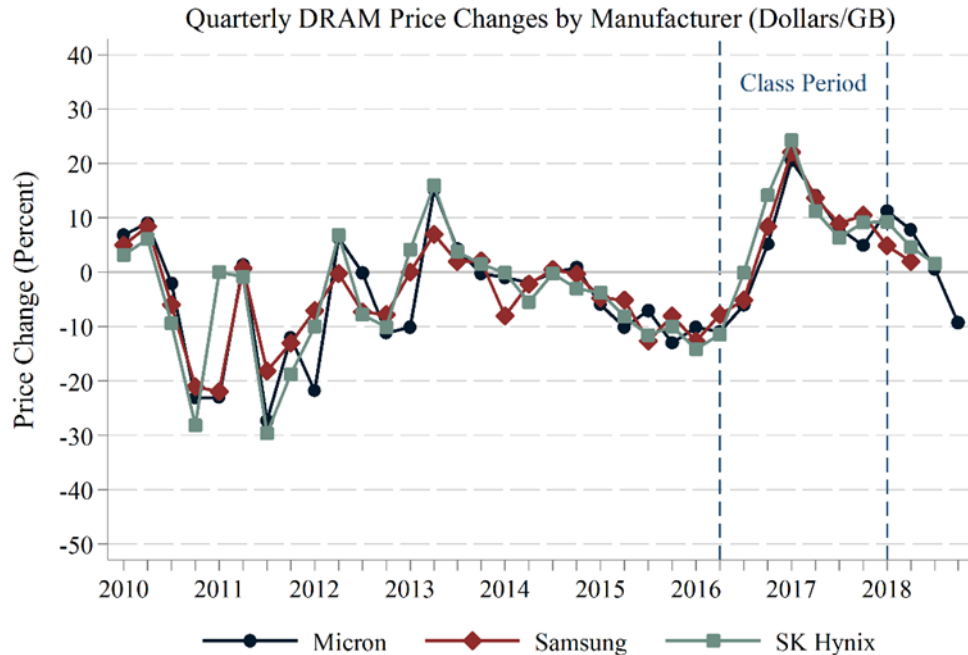
**1. While the Pricing Levels in the Pre-Conspiracy Period Were Highly Varied and Volatile, the Level of Price Variation Between the Defendants Substantially Reduced During the Conspiracy Period. This Economic Evidence Regarding the Convergence of Price Variability is Consistent with the Existence of a Cartel**

185. One commonly employed collusion screen utilized by economists is to compare the variance between Defendants' pricing during non-conspiracy periods with their pricing during the conspiracy period.

186. With respect to the Defendants' DRAM pricing, as the following chart (Figure 1) demonstrates, the period before alleged conspiracy was characterized by much greater volatility

and price variance between the Defendants. The overall variance of price changes outside the conspiracy period was more than 10 times higher than during the conspiracy period.

**Figure 1: DRAM Prices**



Source: Company Results; DRAMeXchange; Wells Fargo Securities LLC.

187. In contrast to the pre-conspiracy period, Figure 1 demonstrates that during the conspiracy there is a strong convergence of price changes by the Defendants. Defendants' price changes track very closely to one another throughout the conspiracy period, but then appears to break down again after the raids by the Chinese competition authority, and the filing of these complaints, during the post-conspiracy period. Given the history of greater price variation and volatility during both the pre- and post-conspiracy periods, the foregoing economic evidence is consistent with the existence of a conspiracy.

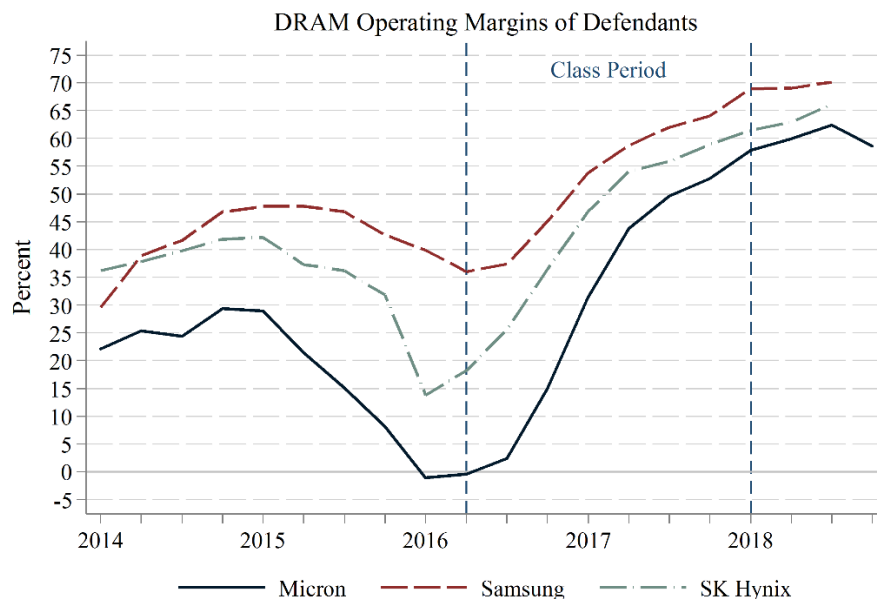
## 2. Defendants' Margins on DRAM During the Conspiracy Period Increased Greatly to Uncompetitive Levels

188. Economic theory indicates that the DRAM industry did not function as would be expected if it were competitive. In industries that are characterized by cyclical demand and short-term inelastic supply, such as electronic components, margins are expected to be higher during the periods of high demand and lower during the periods of low demand. However, economics teaches

that if an industry is truly competitive, firms' prices will be pushed close to marginal costs so that the margins' will be low or near zero on average.<sup>5</sup>

189. However, as the following chart demonstrates (Figure 2), the DRAM-specific margins the Defendants received during the conspiracy period all went up dramatically as compared to the pre-conspiracy period and were sustained at these supra-competitive levels. Indeed, Samsung's DRAM margins appears to grow by 35% from the pre-conspiracy period to 70% close to the end of the conspiracy period. SK Hynix's margins appear to have grown by an astounding 40% by the end of the conspiracy period as compared to just before the conspiracy period. Even more dramatic, Micron's margins moved from a negative number just before the conspiracy period to obtaining near 60% margins on DRAM by the end of the conspiracy period.

**Figure 2: DRAM Margins**



190. The extraordinarily high margins that the Defendants obtained during the conspiracy period, as set forth in Figure 2, is also indicative of the existence of the cartel, especially when compared to the margins they obtained during non-conspiracy periods.

<sup>5</sup> See, e.g., Lieberman, Marc and Robert Ernest Hall. Introduction to economics. Thomson South-Western, 2000.

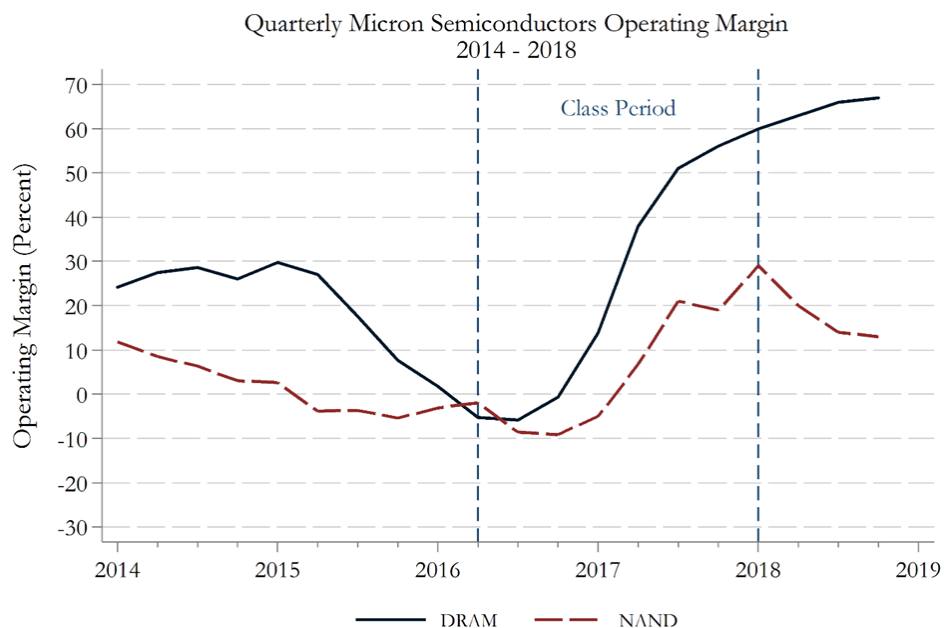
### 3. The Extraordinary Margins that Defendants' Obtained Do Not Align with Margins that Other Manufacturers Received for Comparable Products During the Conspiracy Period

191. In addition to the foregoing, another common test or collusion screen utilized by economists to detect the existence of a cartel, is to compare the margins the Defendants received during a conspiracy period to a competitive benchmark, which can also provide evidence of supra-competitive profits.

192. As the following figures demonstrate, the Defendants' DRAM margins grew substantially as compared to margins obtained on sales of other semiconductor products such as NAND (flash memory chips), CPUs and other semiconductors. These other semiconductors are used in the same applications and share similar production characteristics. Accordingly, because they have common supply and demand factors any substantial differences in their margin behavior may be attributable to the DRAM cartel.

193. For example, for Micron, although their DRAM margins were somewhat more volatile in the pre-conspiracy period, their margins in DRAM were, on average, close to NAND margins (Figure 3).

**Figure 3: Truncated Micron Margins (starting 2014)**

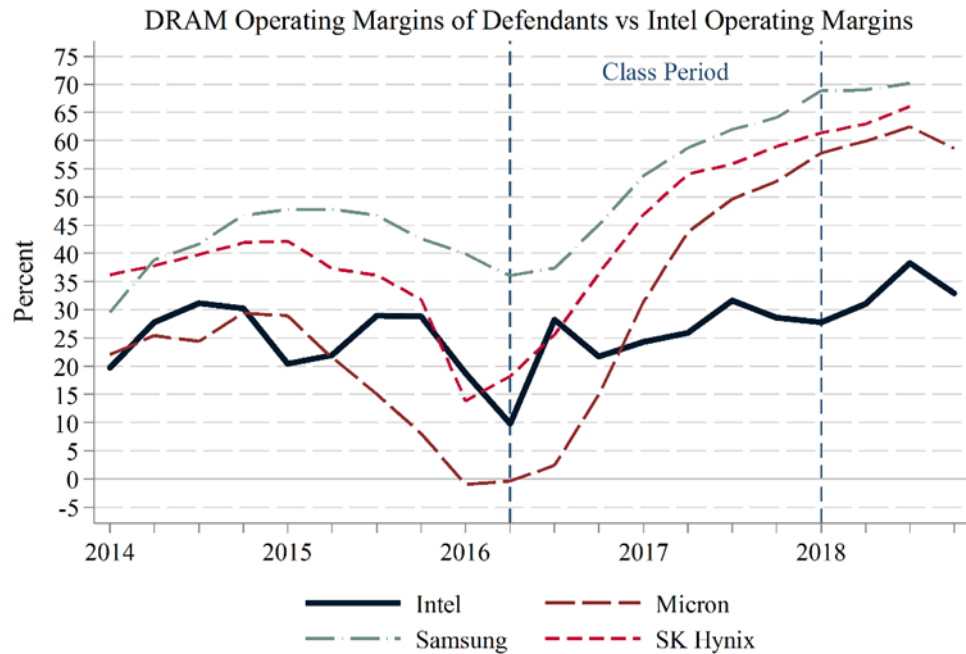


Source: Micron quarterly financial reports 2014-2018.

194. During the conspiracy period, however, Micron's DRAM margins grew close to 60%, while NAND margins hovered around 26%. Indeed, Micron's average margin on DRAM during the conspiracy period was 25.9%, while the average NAND margin was 6.4% during the same period.

195. Similarly, margins for Intel, a major U.S. semiconductor producer, were similar to margins of the DRAM manufacturers (Figure 4) prior to the start of the conspiracy period.

**Figure 4: Comparing Operating Margins**



196. During the conspiracy period, however, while the Defendants' DRAM margins grew close to 60%-70%, Intel's margins remained at the same levels as the DRAM manufacturers before 2016. The foregoing economic evidence is consistent with the existence of a cartel and further bolsters the plausibility of Defendants' collusion.

197. The foregoing economic evidence is consistent with the existence of a cartel and further bolsters the plausibility of Defendants' collusion.

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1                                   **4. The Defendants Acted Against their Own Self-Interest During the**  
2                                   **Conspiracy Period**

3           198. The economic evidence also suggests that the Defendants, who collectively control  
4 approximately 95% of the market for DRAM, acted against their own self-interest by failing (or  
5 refusing) to capture additional market share in favor of maintaining the agreed-upon equilibrium of  
6 the cartel.

7           199. For example, in 2016, when demand for DRAM was increasing, Samsung restricted  
8 DRAM production. Samsung even acknowledged the increase in demand for DRAM in their Q2  
9 2016 earnings report, stating that they “expect demand to increase.” Despite this increase in  
10 demand for DRAM, Samsung cut production.

11           200. Putting Samsung’s production cut to the side, had it continued producing DRAM  
12 consistent with previous periods, it would have earned higher total profits going forward.  
13 Samsung’s decision to cut production in 2016, therefore, was not profit maximizing and appears to  
14 have been against its own self-interest.

15           201. Similarly, after Samsung’s production cut, Hynix and Micron ceased expanding  
16 production, also despite a rising DRAM demand environment. The economic data show that  
17 overall DRAM production levels stagnated even while DRAM prices soared, which indicates that  
18 the major producers were not meeting the level of demand in the market, despite the ability to do  
19 so.

20           202. Had any of the three major DRAM producers increased production in response to  
21 the rising demand, they could have achieved even additional profits and market share.

22           **VIII. VIOLATIONS ALLEGED**

23           203. Plaintiffs incorporate and reallege, as though fully set forth herein, each allegation  
24 set forth in the preceding paragraphs of this complaint.

25           204. Beginning from approximately June 1, 2016—the exact date being unknown to  
26 Plaintiffs—Defendants, by and through their officers, directors, employees, agents, or other  
27 representatives, entered into a continuing contract, combination, or conspiracy to unreasonably  
28 restrain trade and commerce in violation of Section 1 of the Sherman Act, 15 U.S.C. § 1.

1 Defendants, by their unlawful conspiracy, artificially raised, inflated and maintained the market  
2 price of DRAM as herein alleged.

3 205. The contract, combination, or conspiracy consisted of a continuing agreement,  
4 understanding, and concert of action among Defendants and their co-conspirators, the substantial  
5 terms of which were to fix, raise, maintain, and stabilize the prices of, and/or allocate the market  
6 for, DRAM they sold in the United States.

7 206. For the purpose of formulating and effectuating their contract, combination or  
8 conspiracy, Defendants and their co-conspirators did those things they contracted, combined or  
9 conspired to do, including:

- 10 a. Participating in meetings and conversations to discuss the prices of and/or  
11 supply for DRAM;
- 12 b. Agreeing to manipulate prices and supply to boost DRAM sales in a manner  
13 that deprived direct purchasers of free and open competition;
- 14 c. Coordinating the restriction of DRAM capacity in the market; and
- 15 d. Selling DRAM to customers in the United States at non-competitive prices.

16 207. As a direct result of the unlawful conduct of Defendants and their co-conspirators  
17 in furtherance of their continuing contract, combination or conspiracy, Plaintiffs and other  
18 members of the class have been injured in their business and property in that they have paid  
19 more for DRAM than they would have paid in the absence of Defendants' price-fixing.

## 20 **IX. EFFECTS**

21 208. The above combination and conspiracy have had the following effects, among  
22 others:

- 23 a. Price competition in the sale of DRAM by Defendants and their co-  
24 conspirators has been restrained, suppressed, and eliminated throughout the  
25 United States;
- 26 b. Prices for DRAM sold by Defendants have been raised, fixed, maintained,  
27 and stabilized at artificially high and noncompetitive levels through the  
28 United States; and



1           c.       Direct purchasers of DRAM from Defendants have been deprived of the  
2                   benefit of free and open competition in the purchase of DRAM.

3           209.   As a direct and proximate result of the unlawful conduct of Defendants, Plaintiffs  
4 and other members of the class have been injured in their business and property in that they paid  
5 more for DRAM than they otherwise would have paid in the absence of the unlawful conduct of  
6 Defendants.

7 **X.     DAMAGES**

8           150.   During the Class Period, Plaintiffs and other members of the class purchased  
9 DRAM directly from Defendants, or their subsidiaries, agents, and/or affiliates, and, by reason of  
10 the antitrust violations alleged herein, paid more for such products than they would have paid in  
11 the absence of such antitrust violations. As a result, Plaintiffs and the other members of the class  
12 have sustained damages to their business and property in an amount to be determined at trial.

13 **XI.   PRAYER FOR RELIEF**

14           WHEREFORE, Plaintiffs seek judgment against Defendants as follows:

15           1.       That the Court determine that this action may be maintained as a class action under  
16 Federal Rules of Civil Procedure 23(b)(3), that Plaintiffs be certified as class representative, and  
17 Plaintiffs' counsel be appointed as counsel for the class;

18           2.       That the unlawful contract, combination or conspiracy alleged be adjudged and  
19 decreed to be an unreasonable restraint of trade or commerce in violation of Section 1 of the  
20 Sherman Act;

21           3.       That Plaintiffs and the class recover damages, as provided by law, determined to  
22 have been sustained as to each of them, in an amount to be trebled in accordance with the antitrust  
23 laws, and that judgment be entered against Defendants on behalf of Plaintiffs and the class;

24           4.       That Plaintiffs and the class recover their costs of suit, including reasonable  
25 attorneys' fees, as provided by law;

26           5.       That Defendants, their subsidiaries, affiliates, successors, transferees, assignees and  
27 the respective officers, directors, partners, agents, and employees thereof and all other persons  
28

1 acting or claiming to act on their behalf be permanently enjoined and restrained from continuing  
2 and maintaining the combination, conspiracy, or agreement alleged herein;

3 6. That Plaintiffs and the class be awarded pre-judgment and post-judgment interest,  
4 and that such interest be awarded at the highest legal rate from and after the date of service of the  
5 initial complaint in this action; and

6 7. For such other and further relief as is just under the circumstances.

7 **XII. DEMAND FOR JURY TRIAL**

8 Pursuant to Federal Rule of Civil Procedure 38(b), Plaintiffs demand a trial by jury of all  
9 the claims asserted in this complaint that are so triable.

10 Dated: October 21, 2019

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**ATTESTATION**

I, Elizabeth T. Castillo, hereby attest, pursuant to Civil Local Rule 5-1(i)(3), that concurrence in the filing of this document has been obtained from all signatories.

/s/ Elizabeth T. Castillo  
Elizabeth T. Castillo